



## Plastic Pollution

Civil engineers build the world around us – from train stations to tunnels and bridges civil engineers work hard to make our daily lives possible – but they also think of ways to improve lives and the health of the planet. Did you know that civil engineers have saved more lives than doctors by building sewer systems for us to get rid of waste safely?

Another global problem that has caught the attention of civil engineers is plastic pollution. Plastic is a very convenient material that has many uses in our modern world – however after decades of disposable plastic being used across the world we have created a problem that is causing massive damage to the environment.

Our oceans currently have over **five trillion tonnes of plastic** floating around in them which causes lots of problems for the animals living in and near them. It will also break down into toxic pollution over time.

Civil engineers are part of solving this problem. The [Ocean Cleanup project](#) is pioneering the use of giant floating nets and waste catchers in major rivers to tackle the issues of giant floating waste patches in the middle of our oceans and the continued stream of waste travelling down waterways. The ocean plastic catchers do the hard job of concentrating the waste which is spread out over thousands of kilometres. The best part of their design is that the catching systems require no boats to drag them, relying on the natural currents to push them forward which means it's a very low carbon solution to the problem. They call this a 'passive' system as it pretty much operates itself!



Another method is to use drone boats which have no crew. They are controlled by computers and by attaching large nets to them they can roam the oceans collecting plastic and taking it back to land to be recycled.

Your task today is to make and test your own system for cleaning up a model ocean.



Image: Ocean Cleanup's System 001B in action.

## What you'll need

- A bath
- Some plastic items from your recycling bin or selection of small plastic toys
- Household items to make mesh
- Craft materials
- Measuring jug
- Stopwatch/timer

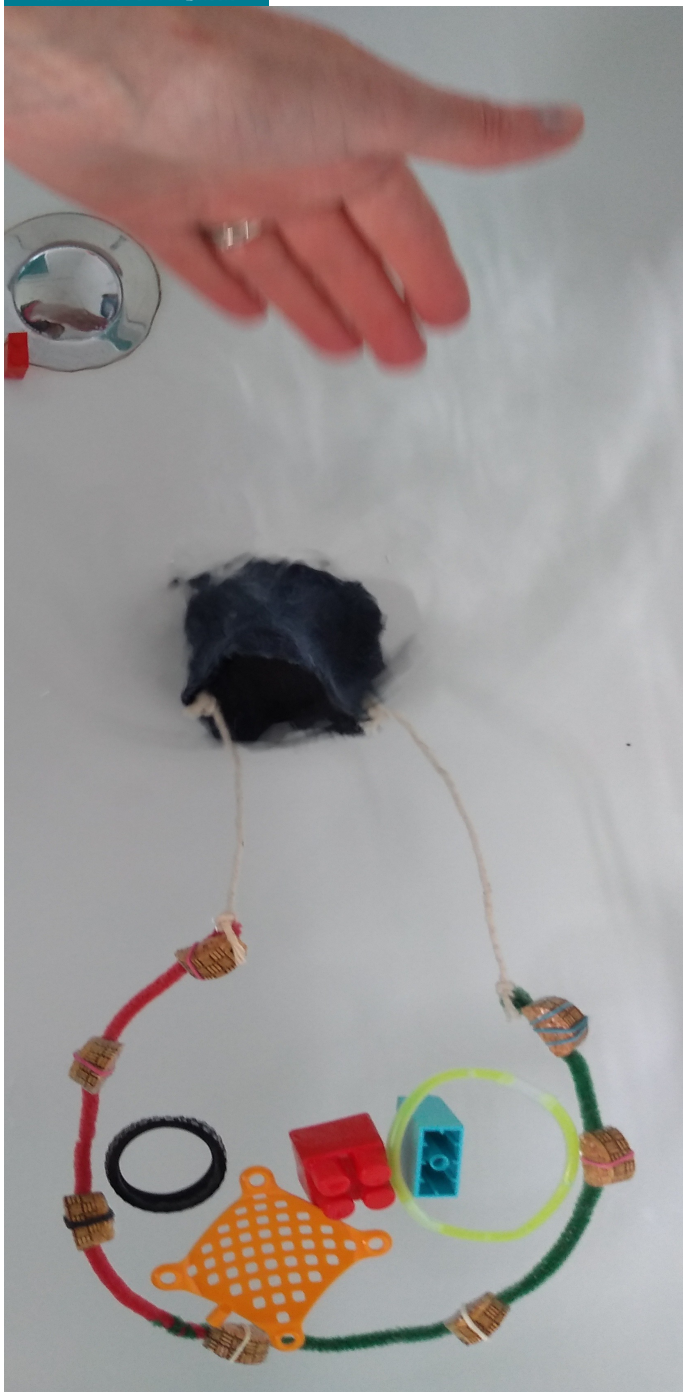
## Activity instructions

**Step 1: Create your polluted ocean.** Start off by filling up your bath tub a quarter to half full (you can always top it up with a bit of warm later for a post activity bath so the water isn't wasted!). Now go into your plastic recycling and give some bottles and cartons a wash before cutting them up into bits of various shapes and sizes. Alternatively you can use small plastic toys that float.

Once this is done you can put them in the bath and now our model ocean is complete, now is when the challenge starts.

**Step 2: Decide what type of plastic catching system you're going to build.** A boat-pulled net or a current-pushed 'passive system'?

We created a current pushed plastic-catcher in the style of Ocean Clean-ups' systems using corks, pipecleaners, elastic bands and a sea anchor (the parachute part) made out of an old sock and some string. We gently moved the water using a hand to imitate the water current and collected all the plastic up successfully.



**Step 3: Collect that plastic!** Enact your clean-up operation and watch carefully to see how you could make it better. Does your net need to be bigger or smaller? In our first test the sea anchor was too heavy and pulled the catcher in the wrong direction so we replaced it with a smaller one made out of lighter material.



After that you have collected all of the plastic with your net your challenge is to find out many grams of rubbish per litre there was in your model ocean. It is important for engineers to figure out statistics like this as it helps them get funding for projects and plan for carrying out the work. Weigh all your plastic with some scales and work out how many grams of plastic per litre was in your model ocean.

Sort out all of the material so you have a pile for each type (check out this [guide from Kids Against Plastic](#) to identifying the main recyclable items) and then recycle or put in your waste bin as appropriate (or back in the toy box!).

## For 16-18 year olds

The Pacific Ocean has 1,400,000,000,000,000,000.00000000000000000000 litres in it! If your model ocean was this size and had the same percentage of plastic waste, how many tonnes of plastic would be in it? (you may have to use an online calculator to do this)

Thank you to the [Ocean Cleanup project](#) for the use of their images.

## More resources on civil engineering

Careers advice for becoming a civil engineer: [ice.org.uk/beacivilengineer](https://ice.org.uk/beacivilengineer)



Careers and activity resources on our website: [ice.org.uk/educationresources](https://ice.org.uk/educationresources)

Civil engineering project case studies: [ice.org.uk/what-is-civil-engineering/what-do-civil-engineers-do](https://ice.org.uk/what-is-civil-engineering/what-do-civil-engineers-do)

Civil engineer (people) case studies: [ice.org.uk/what-is-civil-engineering/who-are-civil-engineers](https://ice.org.uk/what-is-civil-engineering/who-are-civil-engineers)

Info about all types of engineering careers (not just civil): Tomorrow's Engineers  
[tomorrowsengineers.org.uk](https://tomorrowsengineers.org.uk)